Overview of Best Practices Criticality Engineering Perspective

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Personal History

- Mechanical and Nuclear Engineering Degrees
- 1991--1994 Rocky Flats Criticality Engineering
- 1994--2000 Los Alamos National Laboratory

Little Known Axioms

- People don't like to get hurt or to die
- Supervisors and managers don't like people to get hurt or to die
- Institutions don't like people to get hurt or to die

The Importance of Relationships

- **Essential to a program that works**
  - trust
  - honesty
  - helpful
  - proper risk perspective
  - follow through

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Rocky Flats Experience

- 1976 to 1994 the relationship between operations and CS had degraded terribly

- CS was seen hostile and a hindrance
  - approval vs. guidance organization
  - enforcement duties
  - oversight duties

Consequences

- Information was not freely shared
- Evaluations began to include very unrealistic scenarios
- Esoteric controls
  - controls on the number of empty containers
- Confusing postings
- Endless violations

Consequences

- More distrust
- Unauthorized procedure(s) being performed
- Complex wide

Los Alamos Experience

- Criticality Safety was seen as a helpful part of the team
- Guidance organization only
  - line management has signature authority
- Practical production concerns mixed with an honest appraisal of risk

Weaknesses Noted

- **Improperly mentored CSEs can lead to too much cooperation**
  - generic limits
  - too little documentation
  - false impression on the part of operations
- **Improper interpretation of "professional judgement"**
  - technical basis vs. "because I say so"

Evaluations

- Need to be kept as simple as possible
  - experimental data
  - standards
  - reference
  - calculation
- Explained to process supervision (operators)

Documentation

- Geared toward operations supervision
- Centered on process upsets, e.g. tank leaks
- Unambiguous and field verified
- Brief but transferable to any peer, not just the reviewer at the time of creation
- Reviewed by PS before release

Postings

- Information must be verifiable by the operator
- Unambiguous in intent
- Include "shoulds" that add defense in depth but are not requirements

Staff retention

- Greater familiarity with normal (abnormal) conditions
- Greater and greater knowledge of actual processes
  - more efficient evaluations
- Rapport with operations
  - information is transferred more freely to a known friendly face